NEW DIFFUSERS HOOK DISPLAY MARKETS

Can You Imagine . . .

. . . a light-shaping diffuser that brightens the display of a depth finder used in sport fishing.

Marketing its novel Light Shaping Diffusers™ (LSDs), Physical Optics Corporation (POC; Torrance, CA) hooked several new display markets. Based on holographic technology, POC's LSDs offer unusually efficient light-shaping and transmission capabilities that make displays brighter and easier to see. These devices homogenize the light, smoothing out such irregularities as glare and hot spots.

POC's LSDs are used in many unusual display applications, such as the Humminbird® Jimmy Houston Pro Flasher™ depth finder. Techsonic Industries manufactures the depth finder that helps anglers "see" underwater to find fish, grass, brush, and drop-offs in a stream or lake. An LSD provides uniform illumination on the device's display, which uses a spinning disk to present a visual representation of the water depth. Adding the LSD to the depth finder results in a brighter and easier-to-read high-resolution display than previous light-emitting diode (LED) designs.

Originally developed for BMDO space-based sensor applications, the LSD allows designers to shape light, putting it precisely where they need it most. This capability opens up new commercial applications for the optical elements, for example, brightening and giving high contrast to movie screens, flat-panel displays, and high-definition television screens. In addition, the LSDs allow the reading of documents and can improve the illumination capability of spectroscopy, robotic vision, endoscopy, and LED displays. For beam-enhancing applications related to displays, LSDs come as metal-back reflectors, molded lenses, or thin sheets.

AMONG OTHER APPLICATIONS, POC'S TECHNOLOGY HAS FOUND USES IN MACHINE VISION SYSTEMS AND AIRCRAFT INSPECTION TOOLS.

Manufactured as a display screen, a POC LSD widens the angle of overhead slides. This ability allows nearly everyone, no matter where they sit, to see the information projected on the screen. POC developed two LSD products for this area: the front-projection Lights-On Reflection Screen™ and the rear-projection Light Shaper Viewing Screen™.

■ Pictured above is the Humminbird® Jimmy Houston Pro Flasher™ depth finder. POC's technology provides uniform illumination in the finder's display, making it brighter and easier to read.

In addition to display applications, POC's LSDs have appeared in machine vision and aircraft inspection. Kulicke & Soffa Industries, a producer of semiconductor manufacturing equipment, incorporated an LSD assembly in the machine vision system of a wire bonder. Improving brightness and light uniformity, the LSD helps the bonder locate reference points on the die pad during semiconductor manufacture. In aircraft inspection, POC's LSDs offer a simple, low-cost improvement adaptable to most commercial flashlights. Providing even illumination with more than 90 percent of the light transmitted to the subject, this technology improves inspection efficiency and accuracy.

ABOUT THE TECHNOLOGY

LSDs are surface-relief holograms that can be mass-produced inexpensively. An LSD is like a refractive negative lens in that it bends light, but its surface acts as various-sized, randomly distributed microlenses to produce the desired refraction angle.

LSDs shape light in two ways. First, they homogenize the light beam, eliminating variations in brightness caused by the structure of the light source. Second, they control light energy distribution along both the horizontal and vertical axes to match the light source with the area requiring illumination. An LSD produces a diffusion effect based on refraction rather than scattering, allowing more than 90 percent of the light striking the LSD to be transmitted to the target. The inherently antireflective nature of the holographic microstructure results in the high transmission efficiency.